

REMARKS

In paragraph 3 of the final Action, claims 1, 2 and 4-7 were rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' admitted prior art in view of Huang et al. In paragraph 4 of the final Action, claim 5 was rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' admitted prior art in view of Huang et al. and Yamazaki.

In view of the rejections, claim 2 has been cancelled and the subject matter of cancelled claim 2 has been incorporated into claim 1. Also, claim 4 has been amended to depend from claim 1, and claim 7 have been amended to an independent form. Claim 6 has been cancelled.

In a radiation detector of the invention, each switching element is formed of the polycrystalline silicon thin film transistor, and the converting layer is formed of CdTe or CdZnTe. Namely, the material for the converting layer is not a conventional amorphous selenium having a film-forming temperature less than about 250°C (page 2, lines 10-14 of the specification). The polycrystalline silicon thin film transistor used in the invention has a heat resistant temperature more than 300°C, and the material of the converting layer is CdTe or CdZnTe having a film-forming temperature higher than 300°C.

In the invention, since the switching element is formed of the polycrystalline silicon thin film, the converting layer can be formed of a material excellent in sensitivity for X-ray. Thus, it is possible to provide the radiation detector with high S/N ratio and prevent reduction of a dynamic ranged caused by connection of circuits. The combination of the polycrystalline silicon thin film transistor and the CdTe or CdZnTe converting layer is not obvious from the prior art references.

In the admitted prior art as explained in paragraphs 0001 to 0011 of the specification, a radiation detector includes thin film transistors made of hydrogenation amorphous silicon as the switching elements, and amorphous selenium having a heat resistant temperature less than 250°C as the converting layer.

The switching element formed of polycrystalline silicon thin film transistor, and the converting layer formed of CdTe or CdZnTe having a heat resistant temperature more than about 300°C are not disclosed in the admitted prior art.

In Huang et al., it is stated that a typical TFT includes a semiconductor film fabricated from amorphous silicon, poly-silicon, cadmium selenide or other material. Also, in claim 6, the radiation detection layer is fabricated from amorphous selenium, amorphous silicon or CdTe/Cds X-ray detector.

Namely, in Huang et al., amorphous silicon, poly-silicon and CdSe can be used as the TFT, but as explained in the present specification, in order to form CdTe layer, it is required to heat the TFT more than 300°C, so that a-Si and CdSe which have low heat resistant temperature can not be used. Accordingly, Huang et al. simply shows the materials necessary to perform high speed switching by switching element. Also, Huang et al. does not disclose the temperature or requirement in the deposition. Therefore, the combination of the specific materials of the invention is not obvious by a person skilled in the art.

Even if a skilled person knows the deposition temperature of CdTe and melting point of poly-Si, it is not disclosed that in depositing poly-Si under the melting point, the switching characteristic of TFT is largely affected by film-forming temperature history in the course of deposition. This information is obtained by experiments of depositing the converting layer of CdTe to TFT. Thus, the combination of the polycrystalline silicon

thin film transistor and covering layer of CdTe or CdZnTe is not obvious from Huang et al.

In the present invention, CdTe or CdZnTe is used as the converting layer. In Huang et al., CdTe/Cds is used, but the structure, i.e. single crystalline or polycrystalline structure or amorphous structure, is not disclosed.

In any structure of CdTe/Cds, radiation can be changed to electron-hole, but if the single crystal structure is deposited, it is required to place the TFT substrate in an atmosphere of forming the converting layer for a long time. This situation is not preferable because the switching characteristics of TFT are affected by the temperature history, as explained before. Therefore, it is necessary to use polycrystalline structure which can be deposited relatively in a short time, and polycrystalline silicon which has relatively high heat resistance. Otherwise, a conversion layer of CdTe can not be employed. Since Huang et al. does not disclose the above situations, it is not possible or obvious to use polycrystalline silicon as the TFT layer, and CdTe or CdZnTe as the converting layer, and combine together.

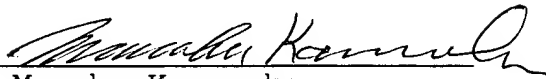
Yamazaki was cited to show signal process circuits in Fig. 8. Although the signal process circuits are shown in Yamazaki, the specific combination of the materials of the switching element and the converting layer as recited in the invention is not disclosed or suggested.

As explained above, the specific combination of the present invention is not disclosed or suggested in the cited references. Even if the cited references are combined, the invention is not obvious from the cited references.

Reconsideration and allowance are earnestly solicited.

Respectfully Submitted,

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